

**CLAIMS**

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

1. A DC/DC converter for managing high voltage gain, the converter  
2 comprising:

3       an input side having a high tap and a low tap;

4       an output side having a high tap and a low tap;

5       a converter circuit interconnecting said input side and said output  
6 side; and

7       a steering branch having at least one rectifier and one of at least  
8 one winding and a capacitor, said steering branch interconnecting said  
9 input side with said output side.

1       2. A DC/DC converter according to claim 1, wherein said converter  
2 circuit is selected from buck, boost, buck-boost, Cuk, Sepic, Zeta, half  
3 bridge boost for low-line input, half bridge boost for high-line input, and  
4 half bridge boost for universal-line input.

1       3. A DC/DC converter according to claim 1, wherein said steering  
2 branch includes a rectifier in series with a winding.

1       4. A DC/DC converter according to claim 3, wherein said converter  
2 circuit is a buck converter; and wherein said rectifier is connected to said  
3 low tap of said input side and said low tap of said output side, and said  
4 winding is connected to said high tap of said output side.

1       5. A DC/DC converter according to claim 3, wherein said converter  
2 circuit is a boost converter; and wherein said winding is connected to said

3       high tap of said input side, and said rectifier is connected to said high tap  
4       of said output side.

1       6.      A DC/DC converter according to claim 3, wherein said converter  
2       circuit is a buck-boost circuit; and wherein said winding is connected to  
3       said low tap of said output side, and said rectifier is connected to said high  
4       tap of said output side.

1       7.      A DC/DC converter according to claim 1, wherein said steering  
2       branch includes a rectifier having an input node and an output node, said  
3       rectifier connected in series at the output node of said rectifier with a pair  
4       of windings, and each of said pair of windings having an input node and an  
5       output node.

1       8.      A DC/DC converter according to claim 7, wherein said converter  
2       circuit is a Cuk converter; and wherein said output node of said rectifier is  
3       connected to both said low tap of said input side and said low tap of said  
4       output side, said input node of a first winding of said pair of windings is  
5       connected to said high tap of said input side, and said output node of a  
6       second winding of said pair of windings is connected to said high tap of  
7       said output side.

1       9.      A DC/DC converter according to claim 7, wherein said converter  
2       circuit is a Sepic converter; and wherein said output node of said rectifier  
3       is connected to said high tap of said output side, said input node of a first  
4       winding of said pair of windings is connected to said high tap of said input  
5       side, and said output node of a second winding of said pair of windings is  
6       connected to both said low tap of said input side and said low tap of said  
7       output side.

1       10. A DC/DC converter according to claim 1, wherein said converter  
2       circuit is a Zeta converter; and wherein said output node of said rectifier is  
3       connected to both said low tap of said input side and said low tap of said  
4       output side, said output node of a first winding of said pair of windings is  
5       connected to both said low tap of said input side and said low tap of said  
6       output side, and said output node of a second winding of said pair of  
7       windings is connected to said high tap of said output side.

1       11. A DC/DC converter according to claim 1, wherein said steering  
2       branch includes a winding having an input node and an output node, said  
3       winding connected in series at said output node with a pair of rectifiers,  
4       each of said pair of rectifiers having an input node and an output node.

1       12. A DC/DC converter according to claim 11, wherein said output  
2       node of a first rectifier of said pair of rectifiers is connected to said high  
3       tap of said output side, and said input node of a second rectifier of said pair  
4       of rectifiers is connected to said low tap of said output side.

1       13. A DC/DC converter according to claim 12, wherein said converter  
2       circuit is selected from a half bridge boost circuit for low-line input, a half  
3       bridge boost circuit for high-line input, and a half bridge boost circuit for  
4       universal-line input.

1       14. A DC/DC converter according to claim 1, wherein said steering  
2       branch includes a capacitor connected to a rectifier, said capacitor having  
3       an input node and an output node, and said rectifier having an input node  
4       and an output node.

1       15. A DC/DC converter according to claim 14, wherein said converter  
2       circuit is a boost converter having center node joining a first inductor a

3 second inductor and a switch, said first inductor connected to said high tap  
4 of said input side, and said second inductor connected to an output  
5 rectifier, said output rectifier connected to said high tap of said output side.

1 16. A DC/DC converter according to claim 14, wherein said rectifier of  
2 said steering branch interconnects said center node with said second  
3 inductor, and said capacitor of said steering branch interconnects said high  
4 tap of said input side with both said second inductor and said rectifier of  
5 said steering branch.

1 17. A DC/DC converter according to claim 14, wherein said rectifier of  
2 said steering branch interconnects said center node with said second  
3 inductor, and said capacitor of said steering branch interconnects both of  
4 said low tap of said input side with said low tap of said output side with  
5 both of said rectifier of said steering branch and said second inductor.

1 18. A DC/DC converter according to claim 14, wherein said converter  
2 circuit is a buck-boost converter having a node connected to an output  
3 rectifier, said first node joining a magnetizing inductor and said high tap of  
4 said input side; and wherein said rectifier of said steering branch  
5 interconnects said first node with said output rectifier, said capacitor of  
6 said steering branch interconnects said low tap of said output side with  
7 both of said rectifier of said steering branch and said output rectifier.

1 19. A DC/DC converter according to claim 14, wherein said converter  
2 circuit is a Sepic converter having a center node connected to an output  
3 rectifier, said center node joining a capacitor with a first inductor, said first  
4 inductor connected to both of said low tap of said input side and said low  
5 tap of said output side, said capacitor connected to a second inductor, said  
6 second inductor connected to said high tap of said input side; and wherein

7        said rectifier of said steering branch interconnects said center node with  
8        said output rectifier, and said capacitor of said steering branch  
9        interconnects both of said low tap of said input side and said low tap of  
10      said output side with both of said output rectifier and said rectifier of said  
11      steering branch.

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